

What is claimed is

- 1 1. A method for manufacturing ohmic contact to a semiconductor
2 including the steps of: forming a plurality of metals on a semiconductor
3 material; heat-treating the plurality of metals in an oxidizing
4 environment so that at least one of the plurality of metals is oxidized
5 to form a p-type semiconductor oxide.
6
- 1 2. A manufacturing method as claimed in claim 1 wherein the
2 semiconductor material is p-type $\text{Al}_x\text{Ga}_y\text{In}_z\text{N}$, and $0 < x, y, z < 1$, and $x + y + z$
3 = 1.
4
- 1 3. A manufacturing method as claimed in claim 1 wherein the plurality
2 of metals includes at least a transition metal which can transform into
3 a p-type semiconductor oxide.
4
- 1 4. A manufacturing method as claimed in claim 1 wherein the plurality
2 of metals includes at least a noble metal which is one of Au, Pt, Rh,
3 Ru, and Ir.
4
- 1 5. A manufacturing method as claimed in claim 1 wherein the film formed
2 on the semiconductor material can be an alloy of transition metal and
3 noble metal.
4

1 6. A manufacturing method as claimed in claim 2 wherein the
2 semiconductor material is p-type GaN.

1 7. A manufacturing method as claimed in claim 3 wherein the transition
2 metal is one of Ni, Mn, Fe, Co, Cr, Cu and Pd.

1 8. An ohmic contact to a semiconductor which is formed on a
2 semiconductor material, including a mixture of p-type semiconductor
3 oxide and metal.

1 9. An ohmic contact as claimed in claim 8 wherein the p-type
2 semiconductor oxide includes a single oxide.

1 10. An ohmic contact as claimed in claim 8 wherein the p-type
2 semiconductor oxide includes a mixture of various oxides.

1 11. An ohmic contact as claimed in claim 8 wherein the p-type
2 semiconductor oxide includes a solid solution of various oxides.

1 12. An ohmic contact as claimed in claim 8 wherein the semiconductor
2 material is p-type $\text{Al}_x\text{Ga}_y\text{In}_z\text{N}$, and $0 < x, y, z < 1$, and $x + y + z = 1$.

1 13. An ohmic contact as claimed in claim 8 wherein the p-type
2 semiconductor oxide is one of NiO, MnO, FeO, Fe_2O_3 , CoO, CrO, Cr_2O_3 , CrO_2 ,

3 1 CuO, Cu₂O, SnO, Ag₂O, CuAlO₂, SrCu₂O₂, and PdO.

1 14. An ohmic contact as claimed in claim 8 wherein the metal is Au,
2 Pt, Rh, Ru, or Ir.

1 15. An ohmic contact as claimed in claim 12 wherein the semiconductor
2 material is p-type GaN.

1 16. An ohmic contact to a semiconductor, which is formed on a
2 semiconductor material, including a layer of p-type semiconductor
3 oxide and a conductive layer.

1 17. An ohmic contact as claimed in claim 16 wherein the semiconductor
2 material is p-type Al_xGa_yIn_zN, and 0 < x, y, z < 1, and x + y + z = 1.

1 18. An ohmic contact as claimed in claim 16 wherein the p-type
2 semiconductor oxide is one of NiO, MnO, FeO, Fe₂O₃, CoO, CrO, Cr₂O₃, CrO₂,
3 CuO, Cu₂O, SnO, Ag₂O, CuAlO₂, SrCu₂O₂, LaMnO₃, YBa₂Cu₄O₈ and PdO.

1 19. An ohmic contact as claimed in claim 16 wherein the layer of
2 semiconductor oxide includes a single oxide layer.

1 20. An ohmic contact as claimed in claim 16 wherein the layer of
2 semiconductor oxide includes a plurality of layers of oxides of the

3 same conductivity type.

1 21. An ohmic contact as claimed in claim 16 wherein the layer of
2 semiconductor oxide includes a mixture layer of various oxides.

1 22. An ohmic contact as claimed in claim 16 wherein the layer of
2 semiconductor oxide includes a solid solution layer consisting of
3 various oxides.

1 23. An ohmic contact as claimed in claim 16 wherein the conductive layer
2 includes a single metal layer.

1 24. An ohmic contact as claimed in claim 16 wherein the conductive layer
2 includes a plurality of metal layers.

1 25. An ohmic contact as claimed in claim 16 wherein the conductive layer
2 is a transparent conductive film.

1 26. An ohmic contact as claimed in claim 17 wherein the semiconductor
2 material is p-type GaN.

1 27. An ohmic contact as claimed in claim 25 wherein the transparent
2 conductive film is conductive oxide, including indium-tin oxide, ZnO
3 and ZnO doped with Ga, In, Al or Ce.